Lesson 6.3 – Simplifying Trigonometric Identities

I. Warm-Up

1. Evaluate all of the trigonometric values. What do you notice?
   a. $\sin(30°)$ and $\cos(60°)$

   c. $\tan(60°)$ and $\cot(60°)$

   b. $\sec(45°)$ and $\csc(45°)$

   d. $\sin(15°)$ and $\cos(75°)$ (Use calculator

2. Which functions are even/odd?
   $$f(x) = \sin x \qquad\qquad f(x) = \cos x \qquad\qquad f(x) = \tan x$$

Cofunction Identities		Even/Odd Identities	
$\sin(\frac{\pi}{2} - u) = \cos u$	$\cos(\frac{\pi}{2} - u) = \sin u$	$\sin(-u) = -\sin u$	$\csc(-u) = -\csc u$
$\tan(\frac{\pi}{2} - u) = \cot u$	$\cot(\frac{\pi}{2} - u) = \tan u$	$\cos(-u) = \cos u$	$\sec(-u) = \sec u$
$\sec(\frac{\pi}{2} - u) = \csc u$	$\csc(\frac{\pi}{2} - u) = \sec u$	$\tan(-u) = -\tan u$	$\cot(-u) = -\cot u$

II. Simplifying More Trig Identities

Prove the following identities are true. Only work on one side of the equation.

1. $\cot\left(\frac{\pi}{2} - x\right)\cos(x) = \sin x$

3. $\cos^4 x - 2\cos^2 x + 1 = \sin^4 x$

2. $\sec\left(\frac{\pi}{2} - x\right)\tan(-x) = -\sec x$

4. $(2\csc x + 2)(2\csc x - 2) = 4\cot^2 x$

III.   Practice

Prove the following identities are true. Only work on one side of the equation.

5. $\tan x + \frac{\sec^2 x}{\tan(-x)} = \cot x$

6. $\csc\left(\frac{\pi}{2} - x\right)\cot(-x) = -\csc x$

7. $\frac{1}{\sec(x)+1} - \frac{1}{\sec(x)-1} = -2\cot^2 x$

8. $\sec^3 x - \sec^2 x - \sec x + 1 = \tan^2 x\,(\sec x - 1)$

9. $\sec^4 x - \tan^4 x = 2\tan^2 x + 1$

10. $\ln(\cos^2 \theta) + \ln(1 + \tan^2 \theta) = 0$